

The Adventure of Echo the Bat

Activities

Ages 6-9 / Grades K-4

May 1999a

Senses

Purpose:

To explain remote sensing

Materials Needed:

Extracts - Peppermint, Maple or Vanilla, Hickory Smoke

Cotton balls

35mm film canisters

Bandannas

Place one cotton ball in each 35mm film canister. Add one or two drops of the extract to each canister. Reseal with film canister lid. This is set Number One. Repeat as necessary for more sets.

Engage

Divide students into small groups (four or five students per group). Ask the groups to discuss what they think remote sensing means. After ten minutes, the groups share their thoughts with the class through an open discussion or science talk.

Exploration

Divide students into groups of five again and give each group a set of canisters and one bandanna. Blindfold one person in each group. Have the other students sit in a circle around the blindfolded student. Ask each student to approach with one of the extracts. Make sure the students do not attempt to walk to the front of the blindfolded student. When the blindfolded student first smells the extract they should say tell the approaching student, who in turn will stop and sit at that location. The next student then takes a turn and this continues until everyone in the circle has had a turn. If the blindfolded student does not smell the extract until the student is very close then the approaching student will sit next to the blindfolded student.

Explanation

Bring the groups together and have them discuss this activity. Guide the discussion towards the five senses. Explain to the students that this is a form of remote sensing: using our senses to gather information about something from a distance. For example, ask the students if they have ever smelled French fries while riding in a car? Ask them if they looked for the McDonald's that was cooking the French fries? Explain to them that they were all doing remote sensing.

Extension

This activity works best on a playground or open field. Give several students whistles.

Blindfold one student and assign them another student to assist them in walking. Ask the students with whistles to go different distances and directions from the blindfolded student. When everyone is ready, have the students with whistles blow them one at a time. The blindfolded students with their aides then try to find the students with whistles. The students with whistles may not move once the game begins. The blindfolded student may ask for the whistles to be blown as many times as they wish.

Evaluation

The students should be able to identify which senses aided their remote sensing capabilities as well as describe other examples of remote sensing, (i.e. binoculars, weather radar, laser detectors, and so on).

Tips for Teachers

Whistling Nerf® footballs can also help explain remote sensing. Have the students play catch with them. Explain to the students how the footballs movement away or closer causes the sound to get fainter or stronger, respectfully.

What Are We Looking At?

Students will:

- Discuss the advantages of different perspectives.

Materials Needed:

Pennies (per student or group)
4 perspective pictures

Engagement

Take students to a grassy area outside and give them a random number of pennies. Tell them that they are farmers and they need to study their land. The pennies will represent the dead crops on their farm and the grass will represent their land. Have them toss the pennies onto the grass. Then, have them lay on their stomach on the grass, so that they are at eye-level with the grass, and count the pennies. Then, have them stand up and count the pennies. Bring them back to the classroom and ask “As a farmer, would you rather study your farm from the ground or from the air? Why?” Discuss briefly.

Exploration

Begin the activity by reading this scenario to students. “Farmer John noticed that plants growing next to the river were sick. He thinks it could be the water.” Show picture 1. Ask students to form hypotheses on what could affect the water quality of the river. Create a list on the board. One prediction may be the train. Continue by showing picture 2. Ask students if this picture changes their hypotheses. Have them modify their list. Repeat this procedure for pictures 3 and 4.

Explanation

Discuss the advantages of the various pictures. Compare this with satellite images. Ask students why people would use satellite images rather than photos taken from the ground.

Extension

Ask students to watch the weather forecast on television for the next three days. Have them compare and contrast the local weather image and the national weather image. Which one provides more information? Which image allows them to predict next week’s weather?

Evaluation

Have students write a scenario where an aerial or satellite perspective would give them more information than photos taken from the ground.

Tips for Teachers

- Perspective pictures - If student copies cannot be provided, print color transparencies. Or, if possible, display the web site on a television in the classroom.

Perspective Pictures

Image 1

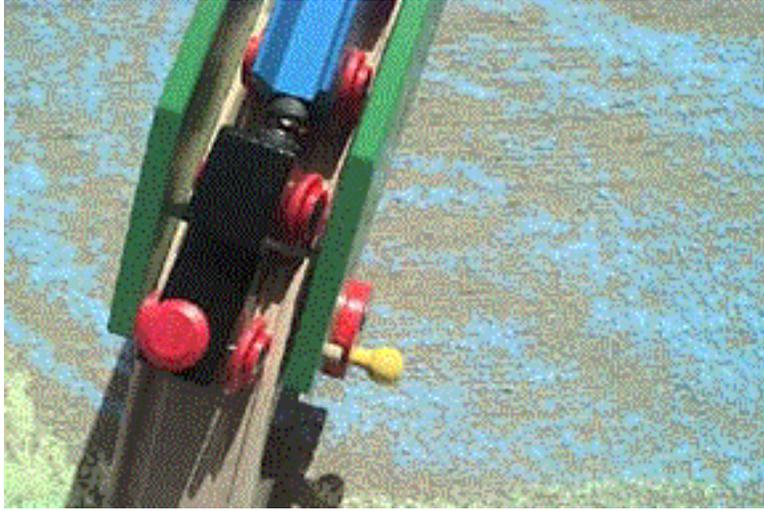


Image 2



Image 3



Image 4



Stream Table

Purpose:

To explain shape and pattern.

Materials Needed:

Various size pebbles

Paint roller pan

Bucket of soil with leaves, pine needles, and so on

Sand (5lb coffee can)

Plastic knife, or trowel, or stick

2 paper cups

Water (approximately 1 gallon)

The above item set is needed for a group of five to six students. Increase as required for larger groups.

Engage

Divide students into small groups (four or five students per group). Ask the groups to discuss what they think mountains and rivers look like to a bird flying over them. After ten minutes, the groups share their thoughts with the class through an open discussion or science talk.

Exploration

Divide students into groups of five again and give each group a set of supplies. Have the groups build a hillside at least five inches high at the shallow end of the paint pan. The students should use a mixture of soil, sand and pebbles to make the hillside. Have the students poke three holes in the bottom of one of the paper cups to resemble a watering can spout. Have the students pour the water into the watering paper cup while holding it over the hillside and observe what happens. Repeat as many times as the students wish, adding and subtracting pebbles, sand, leaves, etc. as they wish. Carefully pour out the water in the paint pan after each session.

Explanation

Bring the groups together and have them discuss this activity. Guide the discussion toward erosion and how different materials eroded at different rates. Explain to the students this is why some areas look different. Sand moves easier than rocks. Dirt moves easier than

sand, and so on. Also ask the students if they tried to make a river, or valley with their materials? What happened when they increased the water speed? Explain how water and wind can cause weathering. Lead them through an example of how an increase in water speed can cause the water to carry heavier objects and cause significant erosion.

Extension

Use plastic topographic maps and place a paper cup at the top of a mountain with one hole in the side of the cup. Have several students drip different colors of food coloring on to rivers, hillsides, and so on. Then pour some water into the cup. As the water drains out of the cup the students can see how the runoff collects as it travels down the mountain, into the river and so on. This activity will also allow the students to see how lakes and rivers are formed.

Evaluation

The students should be able to identify several topographic shapes and patterns, (i.e. hilltops, rivers, lakes, and so on).

Tips for Teachers

Numerous activities address erosion and weather but do not tie directly into remote sensing. Think about other activities we are doing and how they can be linked to aerial observation. By accomplishing this step, your students will be on their way toward understanding remote sensing.

TEXTURE – Bumpy, Wrinkled, Smooth?

Students will:

- Describe textures by touch and appearance
- Describe textures by appearance only
- Identify textures in a satellite image.

Materials Needed:

Paper (4 sheets)

Scissors

Crayons (without paper wrapping)

Worksheet “Bumpy, Wrinkled, Smooth”

Engagement

Ask an adult to help you gather materials/objects with different kinds of texture. Texture words describe how objects feel when you touch them such as: smooth, wet, rough, coarse, fine, soft, hard, scaly, feathery, hairy, furry, grainy, jagged, sharp, pointy, sticky, silky, etc. Some examples of materials with different kinds of texture are: sandpaper, silk scarf, wool sweater, sponge, carpet, gravel, cotton ball, bird feather, honey, thumb tack, etc. Touch each of the materials. Place ones that feel the same together. Draw a picture to show someone how each of the materials felt when you touched it.

Exploration

Have students take a sheet of paper and fold it in half, then half again. Then cut on the folds to make 4 pieces of paper. With the next sheet of paper, have students crumple it up into a ball. Unfold the ball so that the paper lies flat again. Ask the students to describe the texture of the paper. Then, place one of the four smaller pieces on top of the crumpled paper and rub the crayon so that the texture appears. Ask the student to describe the texture that the crayon imaged onto their paper. Reinforce the vocabulary introduced in the first part of this activity.

Continue the exercise with the remaining three pieces of paper. Try making another crayon rubbing with pieces of paper ripped up into confetti sizes. Try making a rubbing of a lump of paper, folded paper, or paper that has not been folded at all. With each crayon rubbing, ask students to describe the texture before making the rubbings and then describe the texture of the crayon rubbings. Group students into groups of 2-4 and ask them to share their rubbings with others in the group. Can they tell what texture the crayon rubbing represent from just looking at the pictures?

Explanation

Ask students to explain what they see in the crayon rubbings that tell them it is bumpy, wrinkled, or smooth? Discuss the advantages of being able to identify a texture without having to touch it. Reinforce the advantages of remote sensing.

Extension

Hand out the “Bumpy, Wrinkled, Smooth” worksheet. Explain that these pictures are from a satellite in orbit around the earth. This is the way Earth looks to a satellite way out in space. Ask them to describe the texture they see in the images. Then ask them to guess what on Earth could have that texture?

Evaluation

Make a pop-up cut and paste. With the worksheet of satellite images, ask students to cut and paste the photos and paste them onto the satellite image that shows that texture.

Color as light

Students Will:

- Create bubbles and colors in light
- Observe the refraction of light and the color spectrum.

Materials Needed:

Light source
Prism or refracting lenses
Plastic straws
Pipe cleaners
Container
Bubble solution
 Dishwashing liquid
 Glycerin
 Distilled or deionized water

Engagement

Demonstrate that white light is made up of all the colors of the rainbow with the use of a prism and light or by having students look at white light through refracting lenses. You can create your own prisms to interpret light as color. Write the following letters on the board R O Y G B I V. Have students look at a rainbow created by the prism or refracting lenses. Ask: What color do you see that starts with the letter 'R'. Write it vertically from the letter R on the board like so:

R O Y G B I V
E
D

Complete the following letters in the same manner establishing the viable color spectrum.

Explanation

White light consists of all the colors of the rainbow. In order, they appear red, orange, yellow, green, blue, indigo, and violet (ROY G BIV). When white light is refracted or "bent" the color spectrum becomes visible as a rainbow. When light waves hit the soap film on bubbles, they reflect and interfere with each other. The interference causes the shimmering of the colors that you see. When white light shines on the bubbles' soap film, some light waves reflect from the front of the surface and some from the back. The sets of reflected waves meet and either adds to each other creating a color mix or cancel each other. When they met, all colors of the spectrum are visible. If a color is not

represented in the bubble, then those two reflected waves have met and cancelled each other. If two red reflected waves meet, red will not appear in the bubble and the bubble will have a bluish-green (cyan) hue.

Procedure (two column format)

- Cut straws and pipe cleaners to desired length. Straws will create the straight sides to your bubble frames. Pipe cleaners act as connectors. Pipe cleaners cut in half work well.

- Fold pipe cleaners so that they are doubled. Layout the straws to create a frame for the desired shape. Use the pipe cleaners to connect the sides of the frame (the straws). To connect three sides together fold the pipe cleaner as shown (Ginger - I have a little drawing to put into the sheet)

- Attach a handle to your frame by using a full-length pipe cleaner.

- You can integrate a few math skills into this lesson by discussing geometric shapes. Try to construct a cube, pyramid, or tetrahedron. Use your imagination and create your own shape.

- You will need containers large enough to hold enough solution to completely submerge your shape when dipped into the bubble solution.

- Dip the shapes into the solution and carefully bring them out, making sure that they have been completely covered with the bubble solution.

- Observe the rainbow colors that are created in the bubble shapes.

How to make the bubble solution:

1. Mix 2/3 cup of dishwashing liquid with one gallon of water. Distilled or deionized water works best.
2. Add 1 tablespoon of glycerin.
3. For best bubble results, let the solution sit for 24 hours.

Extension

Try graphing your results by shape and color observed in the bubble shapes.

Evaluation:

Ask students to name what colors create white light or the visible color spectrum. You may ask younger children to complete the R O Y G B I V activity on their own. Draw a diagram of light going through a prism and have the children label or color the refracted light in the correct order.

Locating Echo

Students will:

- Identify 5 major geographical features illustrated The Adventure of Echo the Bat book.
- Describe the major habitat Echo visits illustrated The Adventure of Echo the Bat book.
- Recall food and shelter Echo finds during migration illustrated The Adventure of Echo the Bat book.

Materials Needed:

The Adventure of Echo the Bat
Paper
Pencils
Crayons or markers
Scissors
Glue
Locating Echo activity sheet

Engagement

1. Read The Adventure of Echo the Bat.
2. Create a chart with the following headings: Land feature, Habitat, Food, Shelter
3. Complete the chart with the information provided in the story.

Exploration

Use the Locating Echo activity sheet to identify the geographical features and habitats within those features that Echo encountered during his adventure. Students can either write words, or paste of the type of shelter that Echo found during his migration. Place these words or pictures with the corresponding geographical feature.

There is a wide diversity of animals, insects, and plants that Echo could find in each habitat. Discuss the insects found in each habitat of the story. Have children place each insect in the habitat in which they were found. Ask them, would these insects also be located in the other habitats? Use the descriptions below to help them place insects in other habitats.

Moths: Moths are often found in the city around streetlights mistaking it for the moon, which they use as a guiding source for direction. In the forest, they camouflage into tree bark during the day and lay eggs in the bark of nearby tree or in other foliage. Moths help in the process of pollination by inadvertently transporting pollen from one plant to another on its wings.

Mosquitoes: Male mosquitoes feed on nectar of flowering plants. Female mosquitoes find nourishment by drinking blood. They will seek a victim just before laying eggs. An increase in the air's carbon dioxide levels alerts them to the presence of human or other mammals. Mosquito eggs are laid in a variety of moist, warm places.

Beetles: Beetles live in a variety of wooded and grassy areas. Many crops are damaged by beetles feeding on them.

After completing the activity sheet, placing the insects in the common habitats, pair students together to play a game.

Asking Good Questions Game:

1. Place a divider between each student so that they can not see each other's completed activity sheet.
2. Each player should place the cut out Echo within a geographical feature/habitat.
3. The players then take turns asking good yes or no questions to try to pinpoint in which geographical feature/habitat Echo is located.
4. By asking good yes or no questions, each player will eliminate clues to locating Echo on their opponent's activity sheet.
5. The player that locates Echo first wins.

Explanation

Discuss how it is possible for different insects, animals, and plants to be cohabitants. For younger students, choose a common natural structure such as a tree. List the number of animals that might call that tree "home". Food webs are good tools to illustrate this concept. For older students, discussions can expand to nocturnal and diurnal species, symbiotic relationships within habitats, or predator-prey relationships.

Extension

Reinforce reading comprehension by creating a story chain. Cut sheets of 8.5x11 paper into 2x11 strips. Refer back to The Adventure of Echo the Bat book. Write on each strip the geographical feature, habitat, food, and shelter Echo found during his migration. Place the strips in a chronological order of events according to the story. (For younger students you may want to have the strips already made for them to put into chronological order. Older students can write their own) Students may want to decorate them with pictures to illustrate the places and things Echo saw. Loop the strips to create a chain, a story chain.

Evaluation

The completed activity sheet and/or story chain can be used as an alternative assessment tool to evaluate comprehension.